Filter papers - a guide

Qualitative filter papers - standard grade

These cellulose filters are used in qualitative analytical techniques to determine and identify materials. Prepleated qualitative filters are also available, which give improved flow rate and increased loading capacity compared to equivalent flat filters. In addition, Whatman™ offers a range of wet strengthened qualitative filters that contain a small quantity of a chemically stable resin to give improved high wet strength. This does not introduce any significant impurities into the filtrate. The resin, however, does contain nitrogen so these grades should not be used in Kjeldahl estimations etc. All wet strengthened grades are available in prepleated forms.

Whatman™provide an extensive range of qualitative filters to meet your specific needs :

Grade 1: 11 µm

The most widely used filter paper for routine applications with medium retention and flow rate. This grade covers a wide range of laboratory applications and is frequently used for clarifying liquids. Traditionally the grade is used in qualitative analytical separations for precipitates such as lead sulphate, calcium oxalate (hot) and calcium carbonate. In agriculture it is used for soil analysis and seed testing procedures. In the food industry, Grade 1 filters are used for numerous routine techniques to separate solid foodstuffs from associated liquid or extracting liquid and is widely used in education for teaching simple qualitative analytical separations.

Grade 2: 8 µm

Slightly more retentive than Grade 1 with a corresponding increase in filtration time (i.e. slightly slower filtration speed). More absorbent than Grade 1. In addition to general filtration in the 8 µm particle size range, the extra absorbency is utilised, for example, to hold soil nutrient in plant growth trials.

Grade 3: 6 µm

Double the thickness of Grade 1 with still finer particle retention and excellent loading capacity; more precipitate can be held without clogging. The extra thickness gives increased wet strength and makes this grade highly suitable for use in Büchner funnels. The high absorbency is particularly valuable when the paper is used as a sample carrier.

Grade 4: 20 - 25 µm

Extremely fast filtering with excellent retention of coarse particles and gelatinous precipitates such as ferric hydroxide and aluminum hydroxide. Very useful as a rapid filter for routine clean-up of biological fluids or organic extracts during analysis.

Grade 5: 2.5 µm

The maximum degree of fine particle filtration in the qualitative range. Capable of retaining the fine precipitates encountered in chemical analysis. Slow flow rate. Excellent clarifying filter for cloudy suspensions and for water and soil analysis.

Grade 6: 3 µm

Twice as fast as Grade 5 with similar fine particle retention. Often specified for boiler water analysis applications.

Grade 595: 4 - 7 µm

Very popular, thin filter paper, medium fast with medium to fine particle retention. Used for many routine analytical applications in different industries, (e.g., particle separation from food extracts or filtration of solids from digested environmental samples, e.g., for ICP/AAS analysis).

Grade 597: 4 - 7 µm

A medium fast filter paper with medium to fine particle retention. Used for a wide variety of analytical routine applications in different industries like food testing

(e.g. determination of fat content acc. to Section 35 LMBG*) or removal of carbon dioxide and turbidity from beverages (e.g. beer analysis).

Grade 598: 8 - 10 µm

A thick filter paper with high loading capacity. Combines medium retention with medium fast to fast filtration speed.

Grade 602 h: <2 µm

A dense filter paper for collecting very small particles and removing fine precipitates. Used in sample preparation, e.g., in the beverage industry for residual sugar determination, acidic spectra, refractometric analysis and HPLC.

Do you use the best filter for your filtration step? Do you want an improved flow or better retention?
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Qualitative filter papers – wet strengthened grades

These extremely strong filter papers have a high wet strength due to the addition of a small quantity of chemically stable resin. Normal qualitative applications will not introduce any significant impurities into the filtrate. The resins do, however, contain nitrogen so these grades should not be used in Kjeldahl estimations, etc. Some wet strengthened grades are available in folded (prepleated) forms.

Grade 91: 10 µm

A general purpose creped filter for less critical routine analysis. Widely used to assay sucrose in cane sugar and within pharmaceutical laboratories for routine filtration.

Grade 113: 30 µm

Ultra-high loading capacity with a particle retention making it ideal for use with coarse or gelatinous precipitates. Fastest flow rate of the qualitative grades. Creped surface. Thickest filter paper in the Whatman™ range.

Grade 114: 25 µm

Only half the thickness of Grade 113 and suitable for coarse or gelatinous precipitates. Smooth surface for easy recovery of precipitates.

Grade 1573: 12 - 25 µm

A fast filter paper with high wet strength. It has a very smooth surface making it easy to scrape or wash off precipitate.

Grade 1575: <2 µm

Slow filter paper with high wet strength.

Qualitative filter papers – folded (prepleated grades)

Timesaving Whatman™ qualitative grades are offered in this convenient form, which have major advantages over flat circles:

- Saves the time required to quadrant fold circles to fit conical filter funnels in repetitive or multiple analyses
- Decreased overall filtration time because of the extra surface area exposed; the normal slow down of filtration speed due to the loading of particulate is postponed
- Increased total loading capacity because more filter area is available
- Maintained flow rate because of the reduction in filter paper contact with funnel side and, of course, the self-supporting shape of the filter itself
- The prepleating does not significantly affect any of the technical data and the same figures may be used for flat circles

Grade 2V: 8 µm

Widely used for general purpose filtration. Has excellent particle retention and a good filtration speed and loading capacity.

Grade 113V: 30 µm

Very thick and strong filter with creped surface for extremely high loading capacity, particularly in folded form. Fastest flow rate of any qualitative grade. Ideal for coarse particles and gelatinous precipitates.

Grade 114V: 25 µm

Strong filter with very fast flow rate. Ideal for coarse particles and gelatinous precipitates. Smooth surface.

Grade 595 1/2: 4 - 7 µm

Very popular, thin filter paper, medium fast with medium to fine particle retention. Used for many routine analytical applications in different industries (e.g., particle separation from food extracts or filtration of solids from digested environmental samples, e.g. for ICP/AAS analysis).

Grade 597 1/2: 4 - 7 µm

A medium fast filter paper with medium to fine particle retention. Used for a wide variety of analytical routine applications in different industries such as food testing (e.g. determination of fat content acc. to Section 35 LMBG*) or removal of carbon dioxide and turbidity from beverages (e.g. beer analysis acc. to EBC or MEBAK).

Grade 1573 1/2: 12 - 25 µm

A fast filter paper with high wet strength. It has a very smooth surface making it easy to scrape or wash off precipitate. Resistant against: sulphuric and nitric acid solutions (up to 40% at 50 °C), hydrochloric (up to 10% at 100 °C, 20% at 60 °C, 25% at 20 °C), alkalis (up to 10% at 20 °C).

Grade 1574 1/2: 4 - 12 µm

A medium fast filter paper with high wet strength.

Quantitative filter papers – ashless grades (Ash 0.007%)

Whatman™ quantitative filters are designed for gravimetric analysis and the preparation of samples for instrumental analysis. They are available in three formats designed to meet your specific needs.

- Ashless: 0.007% ash maximum for grades 40 to 44 and a maximum of 0.01% for 589 grades – very pure filters ideal for a wide range of critical analytical filtration procedures
- Hardened low ash: 0.015% ash maximum – treated with a strong acid to remove trace metals and produce high wet strength and chemical resistance; these filters are particularly suitable for Büchner filtration where the tough smooth surface of the filter makes it easy to recover precipitates
- Hardened ashless: 0.006% ash maximum – acid hardened to give high wet strength and chemical resistance with extremely low ash content; the tough surface makes these filters suitable for a wide range of critical filtration procedures

Grade 40: 8 µm

The classic general purpose ashless filter paper with medium speed and retention. Typical applications include gravimetric analysis for numerous components in cements, clays, iron and steel products; as a primary filter for separating solid matter from aqueous extracts in general soil analysis, quantitative determination of sediments in milk and as a pure analytical grade clean-up filter for solutions prior to AA spectrometry. Used also as a high purity filter in the collection of trace elements and radionuclides from the atmosphere.

Grade 41: 20 - 25 µm

The fastest ashless filter paper, recommended for analytical procedures involving coarse particles or gelatinous precipitates (e.g. iron or aluminum hydroxides). Also used in quantitative air pollution analysis as a paper tape for impregnation when determining gaseous compounds at high flow rates.

Grade 42: 2.5 µm

A world standard for critical gravimetric analysis with the finest particle retention of all Whatman™ cellulose filter papers. Typical analytical precipitates include barium sulphate, metastannic acid and finely precipitated calcium carbonate.

Grade 43: 16 µm

Intermediate in retention between Grades 40 and 41, and twice as fast as Grade 40. Typical applications include foodstuffs analysis; soil analysis; particle collection in air pollution monitoring for subsequent analysis by XRF techniques; and inorganic analysis in the construction, mining and steel industries.

Grade 44: 3 µm

Thin version of Grade 42 retaining very fine particles but with lower ash weight per sample and almost twice the flow rate of Grade 42.

Grade 589/1: 12 - 25 µm

'Black Ribbon Filter' – the established standard in quantitative analysis for the filtration of coarse precipitates (Class 2a acc. to DIN 53 135). Ashless filter paper with very high flow rate. Used for many quantitative standard methods, especially for gravimetric applications (e.g. determination of the ash content in foodstuffs acc. to Section 35 LMBG*), or for the Blaine test in the cement industry.

Grade 589/2: 4 - 12 µm

'White Ribbon Filter' – ashless standard filter paper for medium fine precipitates (Class 2b acc. to DIN 53 135) offering medium filtration speeds. Applied in a variety of routine methods in quantitative analysis, e.g. determination of the sand content in foodstuffs acc. to Section 35 LMBG*; determination of the grade of flour; or analysis of aqueous suspensions in the paper industry.

Grade 589/3: 2 µm

'Blue Ribbon Filter' – ashless standard filter paper for very fine precipitates (Class 2d acc. to DIN 53 135). Slow filter paper with highest efficiency for collecting very small particles. Also used for many analytical routine methods in different industries, e.g. determination of the amount of insoluble contaminants in animal and vegetable fats and oils acc. to Section 35 LBMG*.

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Quantitative filter papers – hardened low ash grades

The maximum ash content of these grades is intermediate between ashless and qualitative. They are particularly suitable for Büchner filtrations where it is desirable to recover the precipitate from the filter surface after filtration. Other characteristics include high wet strength and chemical resistance which are similar to the acid hardened ashless filter papers.

Grade 50: 2.7 µm

Retention of finest crystalline precipitates. The thinnest of all Whatman™ filter papers. Slow flow rate. Hardened and highly glazed surface. This finish also keeps the paper free from loose surface fibres. Highly suitable for qualitative or quantitative filtrations requiring vacuum assistance on Büchner or 3 piece filter funnels. Very strong when wet. Will withstand wet handling and precipitate removal by scraping. In the electronics industry, the virtual absence of fibre shedding is utilised in carriers for integrated circuits.

Grade 52: 7 µm

The general purpose hardened filter paper with medium retention and flow rate. Very hard surface.

Grade 54: 20 - 25 µm

Very fast filtration for use with coarse and gelatinous precipitates. High wet strength makes this grade very suitable for vacuum assisted fast filtration of 'difficult' coarse or gelatinous precipitates.

Quantitative filter papers – hardened ashless grades

These are the supreme quantitative filter papers featuring high wet strength and chemical resistance. These papers are acid hardened, which reduces ash to an extremely low level. Their tough surfaces make them suitable for a wide range of critical analytical filtration operations. Each grade offers a convenient combination of filtration speed and particle retention.

Grade 540: 8 µm

The general purpose hardened ashless filter paper with medium retention and flow rate. Extremely pure and strong with a hard surface. High chemical resistance to strong acid and alkali. Frequently used in the gravimetric analysis of metals in acid/alkali solutions and in collecting hydroxides after precipitation by strong alkalis.

Grade 541: 20 - 25 µm

Fast filtration of coarse particles and gelatinous precipitates in acid/alkali solutions during gravimetric analysis. Typical applications include fibre in animal foodstuffs, gelatine in milk and cream, chloride in cement, and chloride and phosphorous in coal and coke.

Grade 542: 2.7 µm

High retention of fine particles under demanding conditions. Slow flow rate. Very hard and strong with excellent chemical resistance. Often used in gravimetric metal determinations.

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